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Fit (and Healthy) for Duty: Lipid Profiles and Fitness Relationships from Police Officers in a Health and Wellness Program

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INTRODUCTION

- Police work can place officers at high risk of cardiovascular disease (CVD) (6). Numerous factors contribute to this risk for officers, including: increase in sedentary activities (e.g., sitting in a police vehicle), stress, shift work, loss of sleep, reduced physical activity, and poor dietary choices (5,6).
- It is incumbent on police departments to encourage their personnel to at least maintain, if not improve, their health and fitness. One strategy that can be adopted is the utilization of health and wellness programs (3). Health and wellness programs are typically multi-faceted with different foci to cater to the diverse population of law enforcement personnel. These programs can include chronic disease prevention, drug use interventions, injury prevention, stress management, trauma resilience, exercise programming, and health and fitness testing (3).
- Health and fitness testing for police officers can include exercise tests of different capacities, in addition to specific bloodwork. Indeed, lipid profiles can provide an indication of CVD risk (1,4). Profiles of interest include total cholesterol, low-density lipoproteins [LDL], high-density lipoproteins [HDL], and triglycerides (1,4). However, there is no research that has detailed the lipid profiles from police officers within a health and wellness program.
- The purpose of this study was to detail the lipid profiles of police officers from a health and wellness program in 2018-2019, and correlate lipid profiles with different fitness capacities.

METHODS

- De-identified archival data for officers from 2 years of the program were analyzed. This included 169 males and 39 females in 2018, and 194 males and 43 females In 2019.
- Bloodwork (total cholesterol, LDL, HDL, triglycerides) was collected in a fasted or non-fasted state at the selection of the officer.
- Fitness data included: estimated maximal aerobic capacity (VO_{2max}) measured via the Gerkin protocol; sit-and-reach; maximum push-ups; vertical jump; combined grip strength for both hands; sit-ups in 60 s; and absolute and relative one-repetition maximum (1RM) bench press.
- Data were analyzed by year, and lipid profiles were categorized from national standards (1,4). Partial correlations controlling for sex and age derived relationships between lipid profiles and fitness. Significance was set at $p < 0.05$.

Table 1. Desirable blood lipid levels for total cholesterol, low-density lipoproteins [LDL], high-density lipoproteins [HDL], and triglycerides (1,4).

Lipid	Levels
Total Cholesterol	<200 mg/dl
LDL Cholesterol	<100 mg/dl
HDL Cholesterol	≥60 mg/dl
Triglycerides	<150 mg/dl

RESULTS

- Across both years, 68-76% of officers had desirable total cholesterol and HDL; 67-72% of officers had desirable triglycerides. However, 54-62% of officers had LDL above desirable; 13-14% of officers had mildly/borderline high triglycerides; and 16-18% had high triglycerides (Figure 1).
- In 2018, HDL had significant small and trivial correlations with VO_{2max} and sit-ups, respectively (Table 2). Triglycerides had a small correlation with sit-ups. In 2019, HDL had a significant small correlation with VO_{2max} (Table 3).

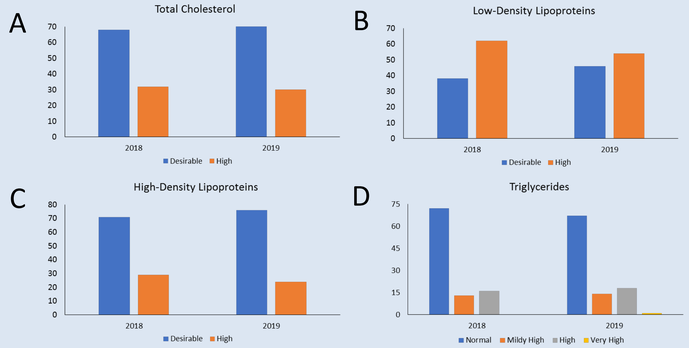

Figure 1. Percentage of police officers in this sample classified according to the categories for total cholesterol (A), low-density lipoproteins (B), high-density lipoproteins (C), and triglycerides (D).

Table 2. Relationships between blood lipids and fitness in police officers from a health and wellness program in 2018.

		Total Cholesterol	LDL	HDL	Triglycerides
Estimated VO_{2max}	*r*	0.044	-0.022	0.230*	-0.094
	p	0.565	0.771	0.002	0.212
Sit-and-Reach	*r*	0.079	0.084	0.049	-0.119
	p	0.298	0.269	0.521	0.116
Push-ups	*r*	0.092	0.060	0.140	-0.084
	p	0.224	0.424	0.062	0.269
Vertical Jump	*r*	0.050	0.020	0.094	-0.036
	p	0.510	0.792	0.214	0.635
Grip Strength	*r*	0.028	0.017	0.146	-0.127
	p	0.716	0.824	0.052	0.092
Sit-ups	*r*	0.014	0.009	0.180*	-0.203*
	p	0.856	0.909	0.017	0.007
1RM Bench Press	*r*	-0.054	-0.031	0.004	-0.086
	p	0.475	0.687	0.953	0.254
Relative Bench Press	*r*	0.026	0.027	0.090	-0.117
	p	0.727	0.725	0.232	0.121

* Significant ($p < 0.05$) relationship between the two variables.

Table 3. Relationships between blood lipids and fitness in police officers from a health and wellness program in 2019.

		Total Cholesterol	LDL	HDL	Triglycerides
Estimated VO_{2max}	r	-0.069	-0.098	0.195*	-0.057
	p	0.376	0.211	0.012	0.462
Sit-and-Reach	r	0.059	0.045	0.129	-0.033
	p	0.448	0.567	0.097	0.672
Push-ups	r	-0.014	0.059	-0.003	-0.099
	p	0.857	0.454	0.967	0.205
Vertical Jump	r	-0.102	-0.025	-0.025	-0.050
	p	0.191	0.748	0.754	0.526
Grip Strength	r	0.107	0.129	-0.025	0.021
	p	0.169	0.097	0.750	0.793
Sit-ups	r	0.017	0.028	-0.023	0.011
	p	0.826	0.725	0.770	0.884
1RM Bench Press	r	0.044	0.065	-0.068	0.029
	p	0.572	0.408	0.381	0.711
Relative Bench Press	r	0.037	0.086	0.004	-0.042
	p	0.633	0.268	0.960	0.594

* Significant ($p < 0.05$) relationship between the two variables.

CONCLUSIONS

- Most officers had good lipid profiles relative to CVD risk. As the health and wellness program was voluntary, the results could be due to healthy worker effect. The healthy worker effect is a bias that can occur in occupational epidemiology studies (2). In this studies' context, less healthy officers were less likely to participate in the program. Nevertheless, the police department should view the data from this study as a positive outcome relative to the general health of their participating officers. There were officers who had poorer lipid profiles who would benefit from continued program participation, validating the importance of such programming within police departments.
- It would be beneficial to recruit more officers to participate in health and wellness programs, although this can be very challenging. Incentives are often used to encourage participation (3). Further, the data shown in this study may provide some evidence as to program participation for officers (i.e., generally healthy lipid profiles).
- Higher VO_{2max} and more sit-ups related to higher HDL, which is preferable. In 2018, lower triglycerides related to higher sit-ups. However, the correlation strengths were only trivial-to-small, and there were no other significant relationships. This could indicate the need for a multifaceted approach for wellness programs in order to reduce CVD risk in officers (i.e., health and fitness testing, exercise programs, diet, wellness education).

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